

Solutions: Random Variables Checkpoint 4

Color-blindness is any abnormality of the color vision system that causes a person to see colors differently than most people or to have difficulty distinguishing among certain colors (www.visionrx.xom).

Color-blindness is gender-based, with the majority of sufferers being males.

Roughly 8% of white males have some form of color-blindness, while the incidence among white females is only 1%.

A random sample of 20 white males and 40 white females was chosen.

Let **X** be the number of males (out of the 20) who are color-blind.

Let **Y** be the number of females (out of the 40) who are color-blind.

Let **Z** be the total number of color-blind individuals in the sample (males and females together).

Question 1

Which of the following is true regarding the random variables X and Y?

Select one answer.
10 points

- ☐ (a) Both X and Y can be well-approximated by normal random variables.
- ☐ (b) Only X can be well-approximated by a normal random variable.
- ☐ (c) Only Y can be well-approximated by a normal random variable.
- ☐ (d) Neither X nor Y can be well-approximated by a normal random variable.

Correct answer: (d)

The remaining questions refer to the following information:

Suppose the scores on an exam are normally distributed with a mean $\mu = 75$ points, and standard deviation $\sigma = 8$ points.

Question 2

The instructor wanted to "pass" anyone who scored above 69. What proportion of exams will have passing scores?

Select one answer.
10 points

- ☐ (a) .25
- ☐ (b) .75
- ☐ (c) .2266
- ☐ (d) .7734
- ☐ (e) -.75

Correct answer: (d)

Question 3

What is the exam score for an exam whose z-score is 1.25?

Select one answer.
10 points

- ☐ (a) 65
- ☐ (b) 75
- ☐ (c) 85
- ☐ (d) .8944
- ☐ (e) .1056

Correct answer: (c)

Question 4

Suppose that the top 4% of the exams will be given an **A⁺**. In order to be given an **A⁺**, an exam must earn at least what score?

Select one answer.
10 points

- ☐ (a) 61
- ☐ (b) 73
- ☐ (c) .516
- ☐ (d) 77
- ☐ (e) 89

Correct answer: (e)